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(merocyte nuclei) come from inwandering supernumerary sperms results from the character of the nuclear figures formed in the division of these nuclei. In comparing the cleavage nuclei with the yolk nuclei the author finds that the latter have at most *half as many* chromatin loops in the spindle stage; these loops are also thicker and shorter. Such reduced nuclei can have come only from sexual cells, from sperms in this case.

In spite of this ingenious nuclear criterion the author cannot affirm that all merocyte structures, even in the elasmobranchs studied, arise from polyspermy, so that the meaning and fate of such bodies is not left in a very satisfactory condition.

ENTOMOLOGY.[1]

Iowa Insects.—Prof. Herbert Osborn, of the Iowa Agricultural College, has recently distributed three important papers concerning Iowa insects. The first[2] gives an annotated list of the Orthoptera of Iowa, and the second[3] is a catalogue of the Hemiptera of Iowa. Both are important contributions to our knowledge of insect distribution. The third[4] paper adds lists of the Hymenoptera, Lepidoptera and Coleoptera of the State. The author considers each of these lists as preliminary, and they doubtless will prove very useful in working up more completely the fauna of Iowa.

Distribution of Spiders.—Until very recently our knowledge of the distribution of North American spiders was very incomplete, there being practically no catalogues of the species found in given localities. Several important papers, however, have lately appeared, which add much to our knowledge of the subject. Mr. Nathan Banks has catalogued The Spider Fauna of the Upper Cayuga Lake Basin[5] in an important paper of over seventy pages, illustrated by five full-page plates. Three-hundred and sixty-three species are enumerated, a large number of which are here described for the first time. Dr. George Marx in his annual address as President of the Entomological Society of Washington, last year[6] gave a list of the Araneæ of the

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[1] This department is edited by Prof. C. M. Weed, Hanover, N. H.

[2] Trans. Iowa Acad. Sci., Vol. i, pp. 116–120.

[3] Trans. Iowa Acad. Sci., Vol. i, pp. 120–131.

[4] A partial catalogue of the animals of Iowa. Ames, Iowa, 1892.

[5] Proc. Phila. Acad., 1892.

[6] Proc. Ent. Soc. Wash., ii, pp. 148–161.

District of Columbia, in which 370 species are recorded, sixty-two of which are new and undescribed. The localities and dates are given. Mr. J. H. Emerton, in the last issue of *Psyche*, announces that his The New England Spiders is ready for distribution, the work consisting of papers published in seven parts in the Transactions of the Connecticut Academy of Arts and Sciences, Vols. vi, vii, and viii. There are descriptions of 340 species and 1400 figures.

Dr. Marx has also prepared[7] a contribution to the study of the spider fauna of the Arctic Regions, compiling a list of 292 species which have so far been found and described from the Arctic regions of the globe. A large number of these are described in a manuscript paper by Dr. Marx that is not yet published. The author summarizes the results of a close study of the polar spider fauna of both hemispheres as follows:

1. "The Arctic spider fauna is composed of the ten families which we may term the common ones, their species constituting the main bulk of the entire spider fauna of the world. They are cosmopolitans, and are found almost wherever animal life is possible.

2. "The genera of the Arctic spider fauna are, without exception, those which also occur in other regions of the world, and there has been found so far not one genus which is original to that zone of eternal ice and snow. This is a very remarkable fact, since in all other Arthropod orders, and those of higher rank, the polar fauna is distinguished by special and peculiar forms.

3. "Even among this species a vast number occur which live in milder climates and under entirely different conditions and influences, and we find some families represented by only such forms, lacking entirely original Arctic species.

4. "The differences between the faunas of the Eastern and Western Hemispheres are slight, and, generally speaking, those forms which are most frequently represented in one are also found in the larger proportion in the other."

The Encyrtinæ.—Mr. L. O. Howard publishes[8] an interesting synopsis of the Encyrtinæ with branched antennæ. He includes six genera, three of which—Calocerinus, Tetracladia, Pentacnemus—are new. Three new species are also described. The paper is illustrated by two excellent plates.

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[7] Proc. Ent. Soc. Wash., ii, pp. 186–200.

[8] Insects of the sub-family Encyrtinæ with branched antennæ. Proc. U. S. Nat. Mus., No. 905.

Directions for Collecting Insects.—Dr. C. V. Riley has prepared and the National Museum has published (Bulletin No. 39, Part F), an admirable pamphlet entitled Directions for Collecting and Preserving Insects. It contains 147 pages and almost as many illustrations, and covers the field in a thorough and systematic manner. It will prove invaluable to all young entomologists, and there are few older ones who cannot derive useful hints from it.

Number of Insect Species.—In the introductory portion of the bulletin just referred to Dr. Riley writes: "The omnipresence of insects is known and felt by all; yet few have any accurate idea of the actual numbers existing, so that some figures will not prove uninteresting in this connection. Taking the lists of described species and the estimates of specialists in the different orders, it is safe to say that about 30,000 species have already been described from North America, while the number of species already described or to be described in the Biologia Centrali-Americana, i. e., for Central America, foot up just about the same number, Lord Walsingham having estimated them at 30,114 in his address as President of the London Entomological Society two years ago, neither the Orthoptera nor the Neuroptera being included in this estimate. By way of contrast the number of mammals, birds, and reptiles to be described from the same region is interesting. It foots up 1937, as follows:

"Mammals, 180; birds, 1600; reptiles, 157.

"If we endeavor to get some estimate of the number of insects that occur in the whole world, the most satisfactory estimates will be found in the address just alluded to and in that of Dr. David Sharp before the same society. Linnæus knew nearly 3000 species, of which more than 2000 were European and over 800 exotic. The estimate of Dr. John Day in 1853 of the number of species on the globe was 250,000. Dr. Sharp's estimate thirty years later was between 500,000 and 1,000,000. Sharp's and Walsingham's estimates in 1889 reached nearly 2,000,000, and the average number of insects annually described since the publication of the Zoological Record, deducting 8 per cent for synonyms, is 6500 species. I think the estimate of 2,000,000 species in the world is extremely low, and if we take into consideration the fact that species have been best worked up in the more temperate portions of the globe, and that in the more tropical portions a vast number of species still remain to be characterized and named, and if we take further into consideration the fact that many portions of the globe are yet unexplored entomologically, that even in the best worked up regions by far the larger portion of the Micro-Hymenoptera and Micro-Diptera remain absolutely undescribed in our collections, and have been but very partially collected, it will be safe to estimate that not one-fifth of the species extant have yet been characterized or enumerated. In this view of the case the species in our collections, whether described or undescribed, do not represent perhaps more than one-fifth of the whole. In other words, to say that there are 10,000,000 species of insects in the world, would be, in my judgment, a moderate estimate."

MICROSCOPY.[1]

Gulland's Method of Fixing Paraffine Sections to the Slide.[2]—After pointing out the difficulties arising from the use of the albumen fixative the author offers the following method:

The tissue is imbedded in the usual manner. In trimming the block for sectioning, care must be taken to see that the surface meeting the razor is exactly parallel to the opposite surface; these surfaces are then coated with soft paraffine, and when this has hardened are again trimmed square. The reason for this special care is that any curve in the ribbon produced by neglect of this precaution is accentuated by the later flattening of the sections. When all the sections required have been cut the ribbon is divided into lengths corresponding to that of the cover glass in use.

A flat glass dish filled with warm water is now provided; the temperature should never be high enough to melt the soft paraffine holding the sections together. Short of this, however, the warmer the water the more rapidly and completely are the sections flattened.

The ribbons are seized at one end with forceps while the other end is gently lowered upon the surface of the warm water; as the sections flatten out they will move along the surface of the water; when the flattening is complete the slide, carefully cleaned, is immersed in the water. The ribbon is floated into its position with a stiff brush; this process is repeated until the slide is full, when it is set up on end until the water is thoroughly drained off. The slide is then transferred to the top of the imbedding oven, where the temperature is a little under 50° C., and where, consequently, the paraffine of the sections is not

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[1] This department is edited by C. O. Whitman, Chicago University.

[2] Jour. of Anat. and Physiol., Vol. xxvi.